The testing-machine employed is of the form devised by Professor Gollner, and used by him at Prague. It is a double lever vertical machine working up to a stress of 20 tons.

The author points out that these results lead to the conclusion that the tenacity of gold is affected by the elements in the order of their atomic volumes, and he discusses the evidence in favour of this view at some length, pointing especially to the fact that while those elements, the atomic volumes of which are higher than that of gold, greatly diminish its tenacity, silver, which has nearly the same atomic volume as gold, hardly affects either its tenacity or its extensibility. He shows that, so far as the experiments have been conducted, not a single metal or metalloid which occupies a position at the base of either of the loops of Lothar Meyer's curve (which is a graphical representation of the periodic law of Newlands and Mendeléef) diminishes the tenacity of gold, while, on the other hand, metals which render gold fragile all occupy higher positions on Meyer's curve than gold does, and he urges that the relations between these small quantities of the elements and the masses of metal in which they are hidden are under the control of the law of periodicity, which states that "The properties of the elements are a periodic function of their atomic weights." Carnelley has given strong evidence in favour of supplementing the law as follows:—"The properties of *compounds* of the elements are a periodic function of the atomic weights of their constituent elements," and the question arises, May the law be so extended as to govern the relations between the constituent metals of alloys in which, as is well known, the atomic proportions are often far from simple?

The effect on gold of small but varying quantities of metals singly and in presence of other metals, demands examination, and their influence on the specific gravity of gold must be ascertained. Until this has been done no explanation as to the mode of action of elements with large atomic volumes will be attempted.

II. "Report of the Observations of the Total Solar Eclipse of August 29, 1886, made at Grenville, in the Island of Grenada." By H. H. Turner, M.A., B.Sc., Fellow of Trinity College, Cambridge. Communicated by the Astronomer Royal. Received February 23, 1888.

(Abstract.)

The first part of the paper gives details of the general arrangements made for observation—the selection of a site, the erection of the instruments and a hut to cover them; and refers to the unfavour-

able conditions under which the observations were made. The second part gives the results of the observations. These were of two kinds.

1. Before and after totality the order of appearance and disappearance of a number of bright lines in the spectrum of the chromosphere and inner corona was watched. The lines selected were those observed by Mr. Lockyer in the Egyptian eclipse of 1882, and the observations were undertaken with a view to the confirmation of his results.

The lines are denoted for convenience by small letters as follows:—

	λ		λ		λ
a	4870·4	*e*	4917·9	*h*	4932·5
b	4871·2	*f*	4919·6	*i*	4933·4
c	4890·0	*g*	4923·1	*k*	4956·5
d	4890·4			*l*	4970·0

With this nomenclature a table given by Mr. Lockyer in a short account of his results ('Roy. Soc. Proc.,' vol. 34, 1863, pp. 291, &c.) shows that lines *g* and *l* are seen by Tacchini in prominences, while *a*, *b*, *c*, *d*, *e*, *f*, and *k* are seen in spots.

Mr. Lockyer saw *g* and *i* 7 minutes before totality,
and in addition *k* and *l* 3 ,, ,,
and all the lines .. 2 ,, ,,

In my own observations I saw *g* 3 minutes before totality,
and in addition *i* 40 seconds ,,

while the moment of appearance of all the lines was indistinguishable from the commencement of totality.

After totality clouds obscured the sun for a short time; but on their clearing the visibility of *g* and *k* was noted; *i* could not be seen.

The three lines *g*, *i*, and *k* were extremely short, and did not appear to extend beyond the chromosphere before and after totality.

The unfavourable conditions under which the observations were made as compared with Mr. Lockyer's—with a low sun and through passing clouds, and an atmosphere charged with moisture which doubtless diminished the light in this region of the spectrum considerably—perhaps account in some measure for the striking difference in vividness of the phenomena. The solar activity was also much nearer minimum in 1886 than in 1882. As far as they go, however, the observations are confirmatory of Mr. Lockyer's, except in the visibility of the line *k* after totality. This line was not noted before totality, and it is possible that the observation may be spurious, although the evidence for it is as good as that for all the observations, which were found to be generally of a difficult character. The instrument used was a 6-inch refractor by Simms, with a grating spectroscope, the grating being $1\frac{1}{2}$ inch square, ruled with 17,000 lines to the inch. The second order of spectrum was used.

2. During totality I was directed to look for currents in the corona. I can only report a negative result. The structure of the corona appeared in a 4-inch refractor, with a power of 80, to be radial to the limb throughout, and no striking differences in special localities were noticed.

Appended to the paper are two drawings which do not attempt to give more than the distances to which the coronal rays extended in various directions. One was made by Mr. St. George with an opera glass, and the other by Lieutenant Smith with the naked eye; but in the latter case the observer's eyes had been specially covered fifteen minutes before totality, and the brighter portions of the corona were screened from him by a disk of angular diameter three times that of the moon. He consequently traced the rays much further than Mr. St. George, though, allowing for this difference in conditions, the drawings are fairly accordant.

III. "On the Ultra-Violet Spectra of the Elements. Part III. Cobalt and Nickel." By G. D. LIVEING, M.A., F.R.S., Professor of Chemistry, and J. DEWAR, M.A., F.R.S., Jacksonian Professor, University of Cambridge. Received February 27, 1888.

(Abstract.)

The authors compare the results obtained by the Rutherfurd grating which they used in measuring the wave-lengths of the iron lines with those obtained with the larger Rowland's grating used for measuring the wave-lengths recorded in this paper, and find them closely concordant. They next compare the measures of wave-lengths of the cadmium lines obtained by them by means of a plane Rowland's grating and a goniometer with an 18-inch graduated circle with those obtained by Bell with a large concave grating of 20 feet focal length. The result of the comparison is that the plane grating gives measures which agree very closely with those given by the concave grating, while the former gives more light and is better for complicated spectra, such as those described in this paper, because the overlapping spectra of different orders are not all in focus together as they are when a concave grating is used.

The authors give a list of 580 ultra-violet lines of cobalt and 408 lines of nickel. They find a certain general resemblance of the two spectra, but no such exact correspondence as the close chemical relationship of the two metals would render probable. They point out that the coincidences of lines of the two metals are hardly, if at all, more in number than would have been the case if the distribution of the lines had been fortuitous. They give a map of each spectrum to the same scale as Ångström's normal solar spectrum.